

REMARKS

Claims 1 – 5, 7 – 14 and 21 – 25 remain in the application and stand rejected. Claims 12 and 21 are amended herein. Claims 6 and 15 – 20 are previously canceled. No new matter is added by this amendment.

The drawings are objected to under 37 CFR .83(a) because, allegedly, “the hard test barrier on and enclosing said conductive layer pad, along with a terminal metal layer (claims 1 and 8),” are not shown in the Figures and because “the copper seed layer pad on and enclosing said diffusion barrier layer (claim 21),” is not shown in Figures 3F and G.

The present application provides that “Figure 1 shows a cross section of a preferred embodiment durable array pad 100” and “Figure 2 shows a flow diagram 120 for forming durable array pads (e.g., 100 in Figure 1)...” Paragraphs 0014 and 15, respectively. “Figures 3A – H show in a cross section, formation of preferred embodiment pads on the surface of a wafer according to the present invention. So, first in step 122 ..., seed metal layers 144, 146 are formed on the wafer 142 [and] conductive barrier layer 144, which corresponds to pad layer 112 in Figure 1,” Paragraph 0016. Thus, the figures are not to be treated as individual different examples of separate inventions, but as illustrating a single common invention. Further, as such, they must be considered together for what they teach (a person skilled in the art) about that invention. Neither are these two cross sections 102, 140, necessarily, of the same or different areas of the same pad or even of the same or of different pad. Figures 3A – G simply show to form a pad such as the pad in Figure 1 according to the same invention. Additionally, the layers 106, 108, 110, 114, 116, 118 of Figure 1, for example, may extend laterally beyond what is shown, as Figures 3A – G tend to indicate, at least for layers 112, 116 and 118.

Moreover, layers 108, 106, 110 and pad 104 of Figure 1 are represented for brevity in Figures 3A – G by wafer 140, as their details are unimportant (as are topological irregularities) to describing how to form the pad 100/148 of layers 112, 114, 116, 118/144, 152, 154, 156. Correspondence for these layers is specifically recited in paragraphs 0016 and 17. Specifically, regarding “the hard test barrier on and enclosing said conductive layer pad, along with a terminal metal layer (claims 1 and 8),” Figure 3F shows “the hard test barrier layer 154 (corresponding to pad layer 116 in Figure 1) is passivated with application of a suitable nickel barrier metal 156 (corresponding to 118 in Figure 1) for solder adhesion.” *Id.* Accordingly, all features recited in claims 1 and 8 are shown in Figures 1 – 3G, as filed. Reconsideration and withdrawal of the objection to the drawings is respectfully requested.

In addition objecting to the drawings for failing to support “the copper seed layer pad on and enclosing said diffusion barrier layer” in claim 21, claims 21 – 24 are rejected under 35 U.S.C. §112 for failing to comply with the written description requirement. Claim 21 is amended herein to recite that, instead of the copper seed layer enclosing another layer, the copper seed layer is enclosed by the nickel layer, i.e., the copper seed layer is nickel plated. The amendment to claim 21 is supported by the specification, the Figures and claims 1 and 8. No new matter is added. Reconsideration and withdrawal of the objection to the drawings and the rejection of claims 21 – 24 under 35 U.S.C. §112 is respectfully requested.

The claims are objected to because claim 12 recites “extends.” Responsive thereto, claim 12 is amended to replace “extends” with --extending-- as directed in the Office action. Reconsideration and withdrawal of the objection to the claims is respectfully requested.

Claims 1 – 5 and 7 are rejected under 35 U.S.C. §102(e) over published U.S. Patent Application No. 2005/0103636 to Cheng et al. Claims 1, 2, 5 and 7 are rejected under 35 U.S.C. §102(e) over published U.S. Patent Application No. 2005/0062170 to Biggs et al. Claims 1, 5, 7 and 8 are rejected under 35 U.S.C. §103(a) over U.S. Patent

No. 6,614,113 to Watanabe et al. in view of U.S. Patent No. 4,876,213 to McCormick. Claims 2 – 4 and 9 – 13 are rejected under 35 U.S.C. §103(a) over McCormick and Watanabe et al. in further view of U.S. Patent No. 6,232,212 to Degani et al. Claim 14 is rejected under 35 U.S.C. §103(a) over McCormick, Watanabe et al. and Degani et al. in further view of, U.S. Patent No. 6,798,050 to Homma et al. and published U.S. Patent Application No. 2003/0034489 to Bhattacharya et al. Claims 21 – 25 are rejected under 35 U.S.C. §103(a) over McCormick and Degani et al.

Regarding the rejections under 35 U.S.C. §102(e) over Cheng et al. and Biggs et al., both applications were published after the filing date of the present application. 35 U.S.C. §102(e) applies to “(1) an application for patent, **published** under section 122(b), by another filed in the United States **before the invention** by the applicant for patent” (emphasis added). Since the present application was filed prior to the publication date of both applications, neither Cheng et al. nor Biggs et al. is available as a reference under 35 U.S.C. §102(e). Therefore, the present application is patentable over both Cheng et al. and Biggs et al. Reconsideration and withdrawal of the rejection of claims 1 – 5 and 7 under 35 U.S.C. §102(e) is respectfully requested.

Regarding the rejection of claims 1 – 5 and 7 – 14 under 35 U.S.C. §103(a) over McCormick and Watanabe et al., alone or further in view of Degani et al., Homma et al., and/or Bhattacharya et al., the Office action acknowledges that Watanabe et al. fails to teach a passivating layer on a hard test barrier layer. McCormick is relied upon to teach this, because it is asserted that “it would have been obvious to the ordinary artisan ... to modify the invention of Watanabe by including a gold layer above the hard test barrier 33A for the purpose of inhibiting oxidation of the nickel layer (col. 3, lines 41-43 of McCormick)).”

Watanabe et al. teaches that “the first conductive metal layer 31 is made of a material such as titanium (Ti)” (col. 4, lines 38 – 40); “the second conductive metal layer 32 is made of a material such as nickel (Ni),” copper (Cu), palladium (Pd) or an alloy thereof, (*Id.*, lines 47 – 57); the “third conductive metal layer 33A” is a plate passivating

barrier layer (“the third conductive metal layer 33A should be made of a material having good adherence with bump 4 (solder bump in this embodiment) and diffusion resistance to the material (solders in this embodiment) for forming the bump 4, or of a material having resistance to the oxidation.”) and moreover, “the third conductive metal layer 33A is made of a material such as gold (Au)” (*Id.*, lines 58 – 67). Watanabe et al. teaches that as an **alternative** to gold, “the third conductive metal layer 33A may be made ... nickel (Ni), or of an alloy ... [thereof]. Each of these metals can ensure the good adherence with the bump 4 and realize the resistance to the oxidation.” Col. 5, lines 1 – 7. Without hindsight as a guide, why would one of ordinary skill in the art be inclined to replace gold with nickel in this Watanabe et al. passivating barrier layer 33A; and then, add another layer of gold? It seems to the applicants that this modification would frustrate the purpose of using nickel instead of gold in the first place. It seems obvious to the applicants that if a gold passivating barrier layer is desired, simply do not replace gold with nickel in the first place. Therefore, the combination of Watanabe et al. and McCormick is not suggested by any reference of record; nor, absent hindsight, does the combination result in the present invention as recited in any of claims 1 – 5 and 7 – 14. Reconsideration and withdrawal of the final rejection of claims 1 – 5 and 7 – 14 under 35 U.S.C. §103(a) over McCormick and Watanabe et al., alone or further in view of Degani et al., Homma et al., and/or Bhattacharya et al., is respectfully requested.

Regarding the rejection of claims 21 – 25 over the combination of McCormick and Degani et al., it is asserted that McCormick shows everything but a terminal metal layer disposed on the gold passivating layer. The Office action asserts that McCormick shows the previously recited “copper seed layer pad on, and enclosing, said diffusion barrier layer” (claim 21, line 4) in “that copper layer 18 encloses layer 15 since it covers the only exposed surface of the layer.” Only by selectively ignoring other elements/teachings of McCormick can one support such an allegation. Using this same rationale applied in rejecting claim 21, the passivation layer 32, not the copper layer 26 encloses layer 15, since it (the passivation layer 32) covers the only exposed surface of the layer. *See, e.g.*, Figure 5. However, what McCormick really teaches is that layer 15 is only partially enclosed by the copper layer 18 and by the passivation layer 32.

Be that as it may, however, claim 21 is amended herein responsive to the objection to the drawings and the rejection under 35 U.S.C. §112 to recite “a copper seed layer pad on said diffusion barrier layer; a nickel layer plated to, and enclosing, said copper seed layer pad;” which is not shown in any reference of record. Therefore, the present invention, as recited in claims 21 – 25, is neither taught nor suggested by McCormick and Degani et al., alone or further in combination with any reference of record. Reconsideration and withdrawal of the rejection of claims 21 – 25 under 35 U.S.C. §103(a) over McCormick and Degani et al. is respectfully requested.

The applicants thank the Examiner for efforts, both past and present, in examining the application. Believing the application to be in condition for allowance, both for the amendments to the claims and for the reasons set forth above, the applicants respectfully request that the Examiner \ reconsider and withdraw the rejection of claims 1 – 5, 7 – 14, and 21 – 25 under 35 U.S.C. §§102(e), 103(a), and 112 and allow the application to issue.

As the applicants have previously noted, the MPEP §706 “Rejection of Claims,” subsection III, “PATENTABLE SUBJECT MATTER DISCLOSED BUT NOT CLAIMED” provides in pertinent part that

If **the examiner** is satisfied after the search has been completed that patentable subject matter has been disclosed and the record indicates that the applicant intends to claim such subject matter, he or she **may note** in the Office action that **certain aspects or features** of the patentable invention have not been claimed and that if properly claimed such claims **may be given favorable consideration**.

(emphasis added.) The applicants believe that the matter presented in the written description of the present application is quite different than, and not suggested by, any reference of record. Accordingly, should the Examiner believe anything further may be required, the Examiner is requested to contact the undersigned attorney at the local telephone number listed below for a telephonic or personal interview to discuss any other changes.

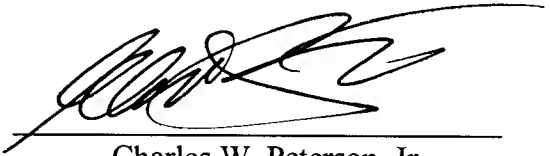
Amendment
November 10, 2006

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Serial No.: 10/707,892

Please charge any deficiencies in fees and credit any overpayment of fees to IBM
Corporation Deposit Account No. 09-0458 and advise us accordingly.

Respectfully Submitted,

November 10, 2006
(Date)

A handwritten signature in black ink, appearing to read 'Charles W. Peterson, Jr.', written over a horizontal line.

Charles W. Peterson, Jr.
Registration No. 34,406

Customer No. 51872
Law Offices of Charles W. Peterson, Jr.
Suite 100
11703 Bowman Green Dr.
Reston, VA 20190
Telephone: (703) 481-0532
Facsimile: (703) 659-1485